Assessing the Efficacy of Indigenous Agroforestry Practices in Enhancing Carbon Sequestration in Tropical Ecosystems

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Abstract. This study investigates the role of indigenous agroforestry practices in carbon sequestration within tropical ecosystems, addressing the pressing challenge of climate change mitigation. Employing a comparative analysis of carbon storage across various agroforestry systems in Southeast Asia, we gathered field data and utilized remote sensing technology to quantify carbon stocks. Our findings reveal that indigenous practices significantly enhance carbon sequestration compared to conventional monocultures, highlighting their potential in climate change strategies. This research underscores the necessity for integrating indigenous knowledge into sustainability frameworks and provides actionable insights for policymakers aiming to bolster ecological resilience. The study concludes with recommendations for scaling such practices to optimize carbon storage across diverse tropical landscapes.

Keywords: carbon sequestration, indigenous agroforestry, tropical ecosystems, climate change mitigation, sustainability practices, biodiversity enhancement, land-use management

Introduction

The challenge of climate change remains one of the most critical issues facing our planet today, exacerbated by rising greenhouse gas emissions and the degradation of natural ecosystems. The urgency of addressing this global problem cannot be overstated, as the Intergovernmental Panel on Climate Change (IPCC) reports indicate an increasing trend in global temperatures, with dire implications for biodiversity, human health, and food security. In this context, agroforestry—defined as the integration of trees and shrubs into agricultural landscapes—emerges as a pivotal strategy for both sustainability and climate change mitigation. While numerous studies have documented the benefits of agroforestry in

enhancing biodiversity and soil health, less emphasis has been placed on the carbon sequestration potential of indigenous agroforestry practices, which are often better adapted to local ecological conditions and socio-economic contexts. This paper aims to fill this gap by systematically examining the efficacy of indigenous agroforestry systems in tropical regions, particularly in Southeast Asia, where deforestation and land-use changes are rampant. Our research is guided by the hypothesis that indigenous practices, rooted in centuries of traditional ecological knowledge, can significantly enhance carbon storage compared to conventional agricultural practices. We will adopt a mixed-methods approach, combining field measurements of carbon stocks with remote sensing technologies to assess the comparative benefits of indigenous agroforestry systems. The structure of the paper is as follows: we first provide a background on the current state of climate change and the role of agroforestry in sustainability. Next, we discuss our methodology, including site selection and data collection procedures. We then present our findings, followed by a discussion of the implications for policy and practice. Finally, we conclude with recommendations for future research and the potential for scaling indigenous practices on a broader level, paving the way for sustainable land use in the face of climate challenges.

References

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